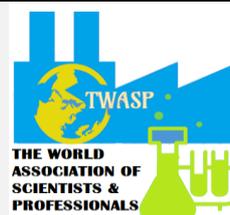




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Research

**Efficacy of fungicides against Stemphylium blight disease of lentil under field condition**

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**Abstract:** Experiments were carried out to search for resistant source(s) and chemicals controlling stemphylium blight disease of lentil at Plant Pathology Division, Bangladesh Agriculture Research Institute, Joydebpur, Gazipur during the period of September 2013 to April 2014. The experimental design was RCBD in field condition having three replications. Eleven lentil test entries along with 2 check variety BARI masur-1 and BARI masur-7 were evaluated. Altogether 6 fungicides i.e. Rovral 80WP (Iprodione, 0.2%), Secure 600 WG (Fenamidone+ Mancozeb, 0.1%), Nativo (Tebuconazole+Trifloxystobin, 0.2%), CM 75WP (Carbendazim+ Mancozeb 0.2%), Dimox 35 (Dimathomorph+Cymoxonil, 0.05%) and Vita Flo 200 FF (Carboxin +Thiram, 0.05%) were evaluated along with a control. The minimum disease score (1.0) was recorded in Rovral 80 WP treated plot and the highest disease score (4.0) was counted in control plot. Among the six fungicides Rovral 80 WP from the iprodione group gave the best performance in respect of plant height (35.50 cm), number of branch per plant (8.33), number of pod per plant (36.67), number of seed per pod (1.98), thousand seed weight (18.50 g) and grain yield (1280 kg ha<sup>-1</sup>).

**Keywords:** Stemphylium, Lentil, Resistant, Susceptible, Fungicide

## 1. Introduction

Lentil (*Lens culinaris* Medik.) is the most ancient cultivated crops among the legumes. It is the second most important pulse crop in terms of both area and production and rates of the highest consumers' preference. It contributes 25% of the total pulse production in the country (Anonymous. 2008). The production of the crop is decreasing every year due to several constraint factors but susceptibility to disease is very important. The major diseases affecting

the crop are *Stemphylium* blight (*Stemphylium botryosum*), Rust (*Uromyces fabae* L.) and Foot rot (*Sclerotium rolfsii* Sacc.). *Stemphylium* blight of lentil was first recorded in Bangladesh by Bakr and Zahid (1986). *Stemphylium* blight of lentil is a defoliating fungal disease of lentil caused by *Stemphylium botryosum* and up to 62% yield losses have been reported in Bangladesh.

Thus, due to the importance of lentil diseases attention needs to be paid to combat these diseases. Among the plant disease management options, use of disease-resistant cultivars is considered as the most economical and best option for management of *stemphylium* blight disease. Although some fungicides are available to manage the *stemphylium* blight disease but it is necessary to develop alternate and more effective control measures with fungicides. This piece of experiment was done to find out effective fungicide(s) against *Stemphylium botryosum* causing *stemphylium* blight disease in lentil.

## **2. Materials and methods**

### **2.1 Experiment details**

The experiment was conducted at the research field of Plant Pathology Division, Bangladesh Agricultural Research Institute (BARI), Gazipur during September to April 2014. The experiment field was high land with soil of sandy loam texture belonging to the Madhupur tract under AEZ-28. All varieties of lentil are not equally susceptible to the *stemphylium* blight disease. Therefore, comparatively more susceptible variety BARI Masur-1 was used in this investigation. The experiment was conducted in Randomized Complete Block (RCB) with 3 replications. Each replication received 7 unit plots (3m x 2m). The space between the block was 1m and between the plots was 1m. The treatments were assigned through a random selection of plots in each block. A susceptible variety BARI Musur-1 (utfala) seeds were used in this experiment. Furrows were made with power tiller driven furrow making device maintaining a distance of 30 cm. The required amounts of seeds for each unit plot were sown in the furrow. The furrows were covered with soil soon after sowing. The line to line distance was maintained 30 cm with continuous sowing of seed in the lines. The seed were sown in the afternoon on November 21, 2013. Altogether 6 fungicides i.e. Rovral 80WP (Iprodione, 0.2%), Secure 600 WG (Fenamidone+ Mancozeb, 0.1%), Nativo (Tebuconazole+Trifloxystobin, 0.2%), CM 75WP (Carbendazim+ Mancozeb 0.2%), Dimox 35 (Dimathomorph+Cymoxonil, 0.05%) and Vita Flo 200 FF (Carboxin +Thiram, 0.05%) were evaluated along with a control.

## **2.2 Application of the spray**

The experiment was monitored regularly to observe the on-set of *Steimphylium* blight disease from 55 days to 110 days. Spraying of fungicides was started when the disease appeared on 55 days. Altogether three sprays were applied at 10 days interval beginning from 55 days after sowing when the symptoms of the disease first appeared in the experimental plots. Spraying was done with the help of a Knapsack type sprayer and 3 liter of suspension of fungicide was used to spray in each unit plot.

## **2.3 Intercultural operation**

Intercultural operation was done in order to maintain the normal hygienic condition of crop growth. Weeding was done two times during the growing period of the crop. One weeding was done at 20 days and another at 35 days after sowing. Light irrigation was provided after each weeding and excess water was drained out immediately to save the crop from stagnant water.

## **2.4 Recording of Stemphylium Blight Severity**

The severity of stemphylium blight disease was recorded at 45, 60 and 75 days after sowing. The severity of stemphylium blight of lentil was rated based on a (0-5) scoring scale described by Bakr *et al.*, 2000.

0-5 scoring scale:

- |   |   |  |
|---|---|--|
| 0 | = | No infection (HR),   |
| 1 | = | Few scattered leaf but no twig blighted (R),                       |
| 2 | = | 5-10% leaflets infected and/or few scattered twig blighted (MR),   |
| 3 | = | 11-20% leaflets infected and/or 1-5% twig blighted (MS),           |
| 4 | = | 21-50% leaflet infected and/or 6-10% twig blighted (S) and         |
| 5 | = | above 51% leaflet infected and/or more than 10% twig blighted (HS) |

## **2.5 Data Collection**

Ten plants of each unit plots were randomly selected at maximum growth stage for recording the data on plant height, number of branch per plant and at maturity stage for recording the data on total number of pods per plant, total number of seed per pod after harvest. Thousand

seeds were counted by a seed counter and weight taken through a high precision digital balance (0.001g). Grain yield of lentil  $\text{kg ha}^{-1}$  was calculated by converting the weight of plot yield into hectare and was expressed in kg.

### **Analysis of data**

The collected data were analyzed statistically. The experimental data were analyzed by MSTAT-C software. Mean comparisons for treatment parameters were compared using Duncan's Multiple Range Test (DMRT) at 5% level of significance.

## **3. Results and discussion**

### **3.1 Fungicidal effect on disease and plant growth parameters**

All the tested fungicides reduced the disease and significantly increased plant growth parameters and yield of lentil compared to control (Table 1 and 2). The severity of Stemphylium blight disease was statistically different in respect of counting period and different treatments. The lowest disease score was observed in plots sprayed with Rovral 80 WP followed by Secure 600 WG indicating their higher disease reducing capability. The highest disease score was recorded in control plot. The plant height differed significantly among the treatments due to the application of fungicides. Plot sprayed with Rovral, Secure and Nativo produced the highest plant height 35.50 cm, 34.40 cm and 34.00 cm, respectively and the lowest plant height was in control plot (22.70 cm). The number of branches per plant varied significantly due to application of fungicides over control. The highest number of branches per plant was recorded in the plot sprayed with Rovral (8.33) followed by Secure (7.33) and Nativo (7.00) and the lowest branches were recorded in control (2.67) preceded by Dimox (5.00) (Table 3). The maximum number of pod per plant was obtained from the plot sprayed with Rovral (36.67) followed by Secure (34.33) and these are significantly differed from each other. The minimum pod per plant was recorded from the control plot (25.00) preceded by Dimox (29.33). The comparatively moderate number of pod plant-1 was obtained from the Nativo, CM and Vita Flo treated plots. The findings of the study is closely related with the study of Sarker *et al.* (1992), Sarker and Erskine (1998), Rashid *et al.* (2009) and Podder (2012). They reported that the lentil lines differed significantly in respect of agronomic traits and yield parameters. The variation in yield of lentil was mainly due to Stemphylium blight disease.

**Table 1: Performance of fungicides in controlling stemphylium blight disease and plant growth parameters of lentil**

<b>Treatments</b>	<b>Disease score (0-5 scale)</b>	<b>Plant height (cm)</b>	<b>Number of branches plant<sup>-1</sup></b>	<b>Number of pod plant<sup>-1</sup></b>
Rovral 80WP	1.00 f	35.50 a	8.33 a	36.67 a
CM 75WP	2.25 c	30.00 c	5.33 c	31.67 cd
Nativo	1.75 d	34.00 b	7.00 b	33.33 bc
Dimox 35	2.75 b	27.60 d	5.00 c	29.33 e
Vita Flo 200 FF	2.25 c	28.20 d	5.33 c	30.33 de
Secure 600 WG	1.50 e	34.40 b	7.33 b	34.33 b
Control	4.00 a	22.70 e	2.67 d	25.00 f
<b>LSD (5%)</b>	0.2468	0.8465	0.8980	2.194
<b>CV (%)</b>	6.50	1.64	9.00	4.09

*Means denoted by same letter does not differ significantly*

### **3.2 Grain yield and yield attributes**

Number of seed per pod ranged from 1.40 to 1.98 and all the treatments differed significantly (Table 2). The highest number of seed per pod was recorded in Rovral (1.98) followed by Secure (1.83) treated plot and the lowest in control plot (1.40). Thousand seed weight also influenced by the application of fungicides and weight was increased over control (Table 2). The fungicides Rovral (18.5 g) and Secure (18.0 g) influenced equally on the thousand grain

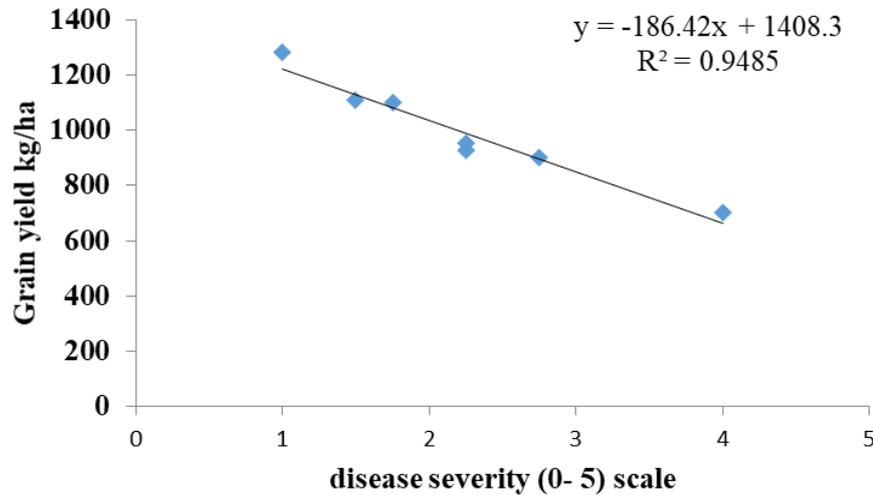
**Table 2: Performance of fungicides in controlling *Stemphylium* blight on grain yield and yield attributes of lentil**

<b>Treatments</b>	<b>Number of seed/ pod</b>	<b>1000 seed weight (g)</b>	<b>Grain yield ( kg/ha)</b>
Rovral 80WP	1.98 a	18.50 a	1280.00 a
CM 75WP	1.63 bcd	15.73 c	951.70 c
Nativo	1.80 abc	17.47 b	1100.00 b
Dimox 35	1.57 cd	14.43 e	900.00 e
Vita Flo 200 FF	1.60 bcd	15.10 d	926.70 d
Secure 600 WG	1.83 ab	18.00 a	1110.00 b
Control	1.40 d	12.80 f	700.00 f
<b>LSD (5%)</b>	<b>0.2409</b>	<b>0.5250</b>	<b>20.79</b>
<b>CV (%)</b>	<b>8.40</b>	<b>1.93</b>	<b>1.23</b>

*Means denoted by same letter does not differ significantly.*

weight. The lowest thousand seed weight was recorded from control plot (12.80 g). The remaining plots treated with other fungicides also gave the statistically different weight. Remarkable effect of fungicides was noticed on the grain yield of lentil and yield was increased considerably compared to control (Table 2). Among the seven fungicides Rovral sprayed plot produced highest grain yield (1280 kg ha<sup>-1</sup>) followed by Secure (1110 kg ha<sup>-1</sup>) and Nativo (1100 kg ha<sup>-1</sup>) and the lowest grain yield was obtained from control plot (700 kg ha<sup>-1</sup>). The application of three fungicides CM, Vita Flo and Dimox also produced significantly higher yield over control. Huq (2007) also reported that the lowest disease was obtained from the Rovral 50 wp treated plot. From the other findings of several other researchers, Rovral 80 WP was the most effective fungicides in reducing the disease score and increasing the yield of lentil against stemphylium blight. These findings are similar to our

result. So it is clear that Rovral 80 WP was most effective fungicides in controlling the disease severity and increasing the seed yield of lentil.



**Figure 1.** The relationship between crop yield (y) and disease severity (x) of *Stemphylium* blight of lentil caused by *Stemphylium botryosum*

### 3.3 Relationship between disease severity and grain yield

The grain yield of lentil was found to have significantl negative correlation ( $r = -0.974$ ) with the severity of *Stemphylium* blight disease caused by *Stemphylium botryosum*. The predicted linear regression line was also displayed downward slope i.e.  $y = -186.4x + 1408$ , where 'y' denoted predicted crop yield of lentil and 'x' stood for disease severity of *stemphylium* blight of the crop (Figure 1). The estimated regression line indicated that the unit rise in the severity of *stemphylium* blight disease (within 0–5 scale) there existed possibilities of yield reduction by 186.4 kg/ha. The regression equation indicated the necessity of controlling *stemphylium* blight of lentil.

## 4. Conclusion

Stemphylium blight of lentil caused by *Stemphylium botryosum* is considered now a day as one of the most important constrains of lentil production in Bangladesh. Six fungicides namely Rovral 80 WP, CM 75 WP, Nativo, Dimox 35, Vita Flo 200 FF and Secure 600 WG along with a control were used to reduce stemphylium blight disease of lentil. Among the fungicides Rovral 80 WP was the most effective fungicides in reducing the disease score and increasing the yield of lentil. The maximum (4.00) disease score was recorded in control plot and the lowest (1.00) in Rovral treated plot. The highest (1280 kg ha<sup>-1</sup>) yield of lentil was recorded when sprayed with Rovral from the iprodione group and the lowest (700 kg ha<sup>-1</sup>) in control plot. The finding of present study revealed that Rovral 80 WP from the iprodione group was able to combat the stemphylium blight disease of lentil caused by *Stemphylium botryosum* and thereby increased the seed yield of lentil. This study confirms the earlier report of controlling stemphylium blight with chemical fungicide Rovral 80 WP.

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